REMARKS

Applicant appreciates the continued thorough examination of the present application that is reflected in the new Official Action of February 13, 2004. Applicant also appreciates the Examiner's withdrawal of all of the prior rejections in view of Applicant's Appeal Brief that was filed on August 8, 2003.

Applicant also appreciates the Examiner's indication that Claims 15, 16, 18, 34, 35 and 37 would be allowable if rewritten in independent form. However, these claims have not been rewritten in independent form, because Applicant respectfully submits that all of the claims are patentable over the cited art.

In particular, the new Official Action rejected all of the pending claims based on Applicant's prior U.S. Patent 5,584,057, referred to herein as the "'057 patent", taken alone or in combination with other secondary references. The '057 patent was cited and discussed at Page 19 of the present application. As will be described in detail below, although the '057 patent broadly describes and claims *"Use of Diversity Transmission to Relax Adjacent Channel Requirements in Mobile Telephone Systems"*, as noted in the title of the '057 patent, the recitations of Claims 1-14, 17, 19-33, 36 and 38-50 are not described or suggested.

Independent Claims 1, 20 and 39 Are Not Anticipated By the '057 Patent

Independent Claims 1, 20 and 39 are system, means-plus-function and method analogs of one another. In order to ensure that these claims are analogs of one another, Claims 20 and 39 have been amended to recite "saturably amplifying". Accordingly, only Claim 1 will be analyzed below, with this analysis applying equally to remaining independent Claims 20 and 30.

Claim 1 recites:

> 1. A transmitter that transmits from a common antenna at a plurality of radio frequencies, a plurality of radio channel frequency signals that are modulated with respective information modulation, the transmitter comprising:
>
> a plurality of modulators, a respective one of which corresponds to a respective one of the plurality of radio channel frequencies, each modulator generating at least one constant amplitude, phase modulated drive signal at the corresponding radio channel frequency from the respective information modulation such that the at least one constant amplitude, phase modulated

> drive signal corresponds to the information modulation for the corresponding radio frequency;
>
> at least one saturated power amplifier for each of the at least one constant amplitude, phase modulated drive signal that is responsive to the corresponding constant amplitude, phase modulated drive signal to produce a corresponding amplified output signal at an output thereof; and
>
> a coupling network that connects the outputs of the saturated power amplifiers in series to produce a combined signal that is applied to the common antenna, such that the common antenna radiates the plurality of radio channel frequency signals that are modulated with the respective information modulation. (Emphasis added.)

As will be described in detail below, the '057 patent does not appear to describe or suggest at least the above-underlined recitations of Claim 1.

In particular, Claim 1 recites that each modulator generates at least one constant amplitude, phase modulated drive signal at the corresponding radio channel frequency. However, in the '057 patent, the encoder/modulators **20**, **26** appear to generate variable amplitude drive signals. In particular, Column 6, lines 14-16 of the '057 patent recites:

> Referring to FIG. 2, a first set of signals A_1-A_8 to be transmitted is modulated onto carrier frequency f1 in the multiple modulator **20**.

Accordingly, there is no suggestion that constant amplitude phase modulated drive signals should be generated. Moreover, Column 3, lines 36-43, of the '057 patent, which relate to Figure 1 thereof, recites:

> Referring to FIG. 1, a number of signals denoted A_1 -A_8 to be transmitted with respectively descending signal strengths are applied to a signal encoder and modulator **1** where they are coded and modulated upon a carrier frequency f1. The composite output signal containing the sum of said modulated signals having desired descending signal strength levels is fed to a transmit power amplifier **3**. (Emphasis added.)

This passage clearly suggests that different signal strength levels are provided so that a constant amplitude, phase modulated drive signal does not appear to be described or suggested.

Moreover, Claim 1 also recites at least one saturated power amplifier for each of the at least one constant amplitude phase modulated drive signal. As is well known to those having skill in the art, a saturated power amplifier is an amplifier driven out of its linear range or, more precisely, an amplifier being operated in such a way that it does not maintain a linear input vs. output characteristic, as clearly shown, for

example, by the square wave symbols in the power amplifiers **912a-912n** of Figure 9, and **1012a-1012n** and **1014a-1014n** of Figure 10 of the present application. In sharp contrast, the '057 patent states at Column 6, lines 16-18:

> The output signal of the modulator is amplified in a high-power transmit amplifier **21**, the output of which is connected to one input of multiplexing filter **22**.

This passage does not suggest saturated power amplifiers. Moreover, Column 3, lines 41-46 of the '057 patent clearly state:

> The composite output signal containing the sum of said modulated signals having desired descending signal strength levels is fed to a transmit power amplifier **3**. The power output of this amplifier is sufficient to cope with the strongest signal A_1 as well as the other signals A_1 -A_8, and can be, for example, a linear power amplifier to minimize intermodulation. (Emphasis added.)

This passage clearly suggests that a linear power amplifier is used and that descending signal strength levels are fed to the linear power amplifier. Accordingly, a saturated power amplifier, as recited in Claim 1, is neither described nor suggested.

Finally, Claim 1 also recites a coupling network that connects the outputs of the saturated power amplifiers in series. In contrast, in Figure 2 of the '057 patent, a directional coupler **23** is used. As clearly shown by the schematic in Block **23**, series coupling of the power amplifier outputs to the antenna is not provided.

Accordingly, the '057 patent does not appear to describe or suggest the combination of (1) constant amplitude, phase modulated drive signals, (2) to at least one saturated power amplifier that is coupled to, (3) a coupling network that connects the outputs of the saturated power amplifiers in series. As noted in the present application, for example at Page 19, line 17-Page 20, line 15:

> Advances in signal processing have, however, improved the ability to use the same channel in adjacent cells, and thus all channels can be theoretically used in all cells, with consequent increases in system capacity. One such technique that uses the same channel in all cells, albeit with debatable capacity improvements, is the first generation CDMA system known as IS95. One of the difficulties of using all frequency channels in all cells is the antenna multicoupling problem, one solution for which was disclosed in U.S. Patent No. 5,584,057 to the present inventor, entitled *Use of Diversity Transmission to Relax Adjacent Channel Requirements in Mobile Telephone Systems*, assigned to the assignee of the present invention, the disclosure of which is hereby incorporated by reference herein. This patent describes coupling even channels to a first antenna and odd channels to a second

> antenna in the same cell, thus doubling the frequency spacing of the channels coupled to the same antenna. For 30 kHz channel spacing as used in AMPS and DAMPS however, doubling the channel spacing may be insufficient to permit efficient multicoupling using conventional combiners. Therefore, despite advances in signal processing such as interference cancellation and/or joint demodulation techniques, which can allow much closer re-use of the same frequency channel, the advantages may be constrained by the inability to efficiently couple adjacent channels to the same antenna.
>
> This problem also can arise in the context of GSM-type systems constructed using a limited amount of spectrum, such as only three, 200 kHz wide channels, which also may be limited in the type of frequency assignments that can be considered using conventional antenna multicouplers. Moreover, future evolution of GSM to transmit higher data rates, which enhancement is called "EDGE", includes use of a non-constant envelope 8-PSK modulation. Thus, the second embodiments of the invention as described in Figure 10 may be adapted for systems such as IS95, GSM/EDGE and DAMPS which employ linear, non-constant-amplitude modulation waveforms. EDGE employs a linear, 8-phase signal (8-PSK) where the term "linear" implies that the transitions between successive 8-PSK symbols does not follow a constant amplitude trajectory but rather a spectral band limited trajectory. Other well-known modulations that use both amplitude and phase to convey information are multi-level Quadrature Amplitude modulations such as 16QAM, 64QAM, 256QAM and so on.

Accordingly, the recitations of Claim 1, and remaining independent Claims 20 and 39, are not described or suggested in the '057 patent. Applicant therefore respectfully requests withdrawal of the rejection of Claims 1, 20 and 39, and of the dependent claims that depend therefrom.

Many of the Dependent Claims Are Independently Patentable

Applicant appreciates the Examiner's indication that Claims 15, 16, 18, 34, 35 and 37 are independently patentable. However, Applicant respectfully submits that many of the other dependent claims are independently patentable.

In particular, Claim 13 recites:

> 13. A transmitter according to Claim 1 wherein the coupling network comprises a plurality of transformers, each having a primary and a secondary, a respective primary being coupled to a respective output of a respective saturated power amplifier, the secondaries being serially coupled to the common antenna.

Similar recitations may be found in Claim 32. The Official Action states at Page 3 that:

> ...additionally, Dent disclose[s] the coupling network (22) comprises a plurality of transformers each having primary and secondary, a respective primary (f1, f2) being coupled to a respective output of a respective saturated power amplifier (21, 27), the secondary being coupled together to the common antenna (25) as exhibited in figure 2.

However, Applicant respectfully submits that Block 22 of the '057 patent is a "multiplexing filter" with f1 and f2 being carrier frequencies. Applicant can find no description or suggestion in Dent that the multiplexing filter Block 22 of the '057 patent Figure 2 includes a plurality of transformers connected as recited in Claim 13. Accordingly, Claim 13 is independently patentable.

Claim 14 recites:

> 14. A transmitter according to Claim 1 wherein the coupling network comprises a plurality of quarter wavelength transmission lines each having first and second ends, a respective first end being coupled to a respective output of a respective saturated power amplifier, the second ends being coupled together to the common antenna.

This claim was rejected using the same language as the rejection of Claim 13. Again, Dent does not appear to disclose or suggest the use of quarter wavelength transmission lines or other recitations of Claim 14, or analogous Claim 43.

Finally, Claims 17 and 36 were rejected as being obvious over the '057 patent in view of U.S. Patent 5,308,384 to Ashby et al. However, Claim 17 recites:

> 17. A transmitter according to Claim 1 wherein the saturated power amplifiers each include bilateral amplifier devices that draw current from a DC power supply and supply current to the DC power supply during operation.

Analogous recitations may be found in Claim 36. The Official Action states, at Page 8:

> In the same field of endeavor, Ashby et al., further discloses a[n] apparatus system and method for transmitting secure signals over narrow spaced channels. In addition Ashby et al. discloses the power amplifiers each include bilateral amplifier devices that draw current from a DC power supply and supply current to the DC power supply during operation (as disclosed in column 19 lines 48-49).

Applicant respectfully submits, however, that Ashby et al. Column 19, lines 48-49 state:

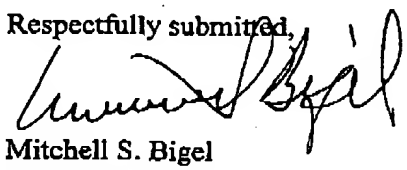
> The lithium battery supplies the power supply backup necessary to maintain data integrity in the SRAM 24.

This passage does not describe or suggest saturated power amplifiers. Moreover, Applicant respectfully submits that this one mention in Ashby et al.'s *"Apparatus, System and Method for Transmitting Secure Signals Over Narrow Spaced Channels"* (see the Ashby et al. title), would not suggest making the saturated power amplifiers of Claim 1 a bilateral amplifier device. Accordingly, Claims 17 and 36 are separately patentable.

Conclusion

Applicant appreciates the continued thorough examination of the present application and the withdrawal of the earlier rejections. Applicant also appreciates the citation of Applicant's prior '057 patent, which was already cited and described in the Applicant's specification. Applicant has now shown that, although the '057 patent broadly describes and claims the use of diversity transmission to relax adjacent channel requirements in mobile telephone systems, the recitations of independent Claims 1, 20 and 39 are not described or suggested. Moreover, many of the dependent claims are independently patentable, in addition to those dependent claims that already have been acknowledged as independently patentable. Accordingly, Applicant respectfully requests withdrawal of all of the outstanding rejections and allowance of the present application.

Respectfully submitted,



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Susan E. Freedman
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